Health and Safety
Commission

Approved Code
of Practice

Classification and labelling of substances dangerous for supply and/or conveyance by road

Notification of New Substances Regulations 1982
Classification, Packaging and Labelling of Dangerous
Substances Regulations 1984

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Preface

Under the Notification of New Substances Regulations 1982, suppliers of new substances are required, with some exceptions, to send information to the Health and Safety Executive on the identity and properties of those substances. This includes information on the classification and on recommendations for labelling substances dangerous for supply. These are derived from the results of the tests carried out to enable a notifier to determine the characteristic physico-chemical and toxicological properties of a new substance.

Further, under the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984, the packaging of a substance which is classified as dangerous for supply and/or dangerous for conveyance by road is required to be labelled when it is supplied and/or consigned for conveyance by road. The classification and the labelling to be shown on the packaging of a new substance for supply correspond to those detailed under the notification requirements. Some requirements are laid down for the testing of other substances but in general their classification and labelling is derived either from *Information Approved for the Classification, Packaging and Labelling of Dangerous Substances,* published by the Health and Safety Commission or, to the extent that such information has not yet been approved, from the characteristic physico-chemical and toxicological properties of the substances established from existing information.

This Code of Practice gives practical guidance on the classification and labelling of substances dangerous for supply and/or dangerous for conveyance by road on the basis of their characteristic properties. It is one of a series of two, relating to the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984. The series comprises:

- Classification and Labelling of Substances Dangerous for Supply and/or Conveyance by Road.
- Packaging of Substances Dangerous for Conveyance by Road.

It also relates to the Notification of New Substances Regulations 1982 and to two Codes of Practice approved for the purpose of providing practical guidance on those Regulations, namely:

COP 9 - Methods for the Determination of Physico-chemical properties

COP 10 - Methods for the Determination of Toxicity.

In the case of new substances, the guidance is related to results obtained from test methods recommended and described in the Codes of Practice COP 9 and COP 10 and thus enables the supplier to determine the characteristic properties of the substances directly from the data.

In the case of substances other than new substances, the guidance can be applied to data obtained from those test methods, to data obtained from test methods equivalent to those described in those Codes of Practice and to data available from other sources to determine whether a substance has the characteristic properties specified in Schedules 1 and 2 of the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984.

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Notice of Approval

By virtue of Section 16(1) of the Health and Safety at Work etc Act 1974 and with the consent of the Secretary of State for Employment the Health and Safety Commission has on 8 August 1984 approved the Code of Practice *Classification and Labelling of Substances Dangerous for Supply and/or Conveyance by Road.*

The Code of Practice is approved for the purpose of providing practical guidance with respect to the Notification of New Substances Regulations 1982 and the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984.

The Code of Practice comes into effect on 12 September 1984 which is the date when the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984 come into operation.

Signed

C JOHNSON

Secretary to the Health and Safety Commission

Approved Code of Practice

Introduction

1 This Code of Practice has been drawn up on the basis of joint consultation between representatives of the Confederation of British Industry, the Trades Union Congress, the Local Authorities, independent experts, Government Departments and the Health and Safety Executive.

2 The Code has been approved by the Health and Safety Commission, with the consent of the Secretary of State, under Section 16(1) of the Health and Safety at Work etc Act 1974 for the purpose of providing practical guidance with respect to the provisions relating to classification and labelling in Regulation 4(1) and Schedules 2 and 3 to the Notification of New Substances Regulations 1982 (SI 1982 No 1496) as amended by Regulation 16(9) of the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984 (SI 1984 No.1244) and with respect to the provisions of Regulations 5(1), (3) and (5), 6(1) and (4), 8(2) and 9(2) and Schedules 1, 2, 6 and 7 to the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984 (SI 1984 No.1244).

3 Although failure to comply with any provision of this Code is not in itself an offence, that failure may be used in criminal proceedings as evidence that a person has contravened a regulation to which the provision relates. In such a case however it will be open to that person to satisfy the court that he has complied with the Regulation in some other way.

4 Words and expressions used in this Code of Practice have the same meaning as in the Regulations to which they give practical guidance, unless the context requires otherwise.

5 Reference in this Code of Practice to another document does not imply approval by the Health and Safety Commission of that document except to the extent necessary to give effect to this Code of Practice.

Classification and labelling requirements

6 The large number of dangerous substances now being supplied and/or conveyed by road, as much as the requirement to meet Treaty obligations or otherwise fall into line with international agreements or recommendations, leads to the need, for both supply and conveyance purposes, to specify different rules for different types of substance.

7 The different rules are summarised in Table 1 which also indicates the scope of the guidance set out in this CODE OF PRACTICE. The guidance is applicable in any case where it is necessary to make the most appropriate choice of symbol or hazard warning sign to denote classification, or choice of any other particular which is to be shown on a label. It is not applicable when specific classification and/or labelling requirements are laid down under the relevant Regulations.

8 The guidance should be read in the context of the requirements laid down under the relevant Regulation for the type of substance being considered. Thus, the term 'substance' used throughout this Code of Practice can in turn mean 'substance', 'new substance' or 'notifiable substance' as defined by Regulation 2(1) to the Notification of New Substances Regulations 1982, or for example 'substance', 'preparation' or 'pesticide' as defined by Regulation 2(1) to the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984.

9 The guidance is separated into two parts, the first to cover supply and the second to cover conveyance by road. Regulations 10 and 11 to the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984 show how the separate labelling details may be combined under certain circumstances.

Table 1 Summary of Classification and labelling requirements

Part 1 Substances dangerous for supply

Statutory Instrument	*Type of substance*	*Classification*	*Labelling*
Notification of New Substances Regulations 1982 (NNSR)	Notifiable new substances	Declare particulars of classification in accord with Reg 4(1)(c), Schedule 2 and this CODE OF PRACTICE. See also CPL below.	Declare recommendations for labelling in accord with Reg 4(1)(c)*, Schedule 3 and this CODE OF PRACTICE. See also CPL below.
	New substance not notifiable	When required by Reg 4(3) and Schedule 4, make recommendations for classification in accord with Reg 4(1)(c), Schedule 2 and this CODE OF PRACTICE, unless Reg 4(4) applies. See also CPL below.	When required by Reg 4(3) and Schedule 4, make recommendations for labelling in accord with Reg 4(1)(c), Schedule 3 and this CODE OF PRACTICE unless Reg 4(4) applies. See also CPL below.
Classification Packaging and Labelling of Dangerous Substances Regulations 1984	Substance specified in Part IA of the Approved List** as dangerous for supply	By Reg 5(2), that shown in column 2 of Part IA of the Approved List.	Show particulars in accord with Reg 8(2), Schedule 6.I and Part IA of the Approved List.
(CPL)	Notifiable new substance	By Reg 5(3), in conformity with NNSR, see above.	Show particulars in accord with Reg 8(2), Schedule 6.I and this CODE OF PRACTICE.
	Pesticide preparation	By Reg 5(4)(a), in accord with Schedule 3. Thus in part in accord with Reg 5(5) and this CODE OF PRACTICE.	Show particulars in accord with Reg 8(2), Schedule 6.I and except as indicated in that Schedule, this CODE OF PRACTICE.
	Solvent preparation	By Reg 5(4)(b), in accord with Schedule 4.	Show particulars in accord with Reg 8(2), Schedule 6.I and this CODE OF PRACTICE.
	Paint, varnish, printing ink, adhesive and similar products	By Reg 5(4)(c), in accord with Schedule 5.	Show particulars in accord with Reg 8(2), Schedule 6.I and II and this CODE OF PRACTICE.
	Any other substance including new substance not subject to notification (see NNSR above), any other preparation or other mixture	By Reg 5(5), in accord with the characteristic properties specified in column 1 of Part I of Schedule 1 and this CODE OF PRACTICE, unless Reg 5(6) applies because it is not reasonably practicable to classify a waste eg if it has an uncertain composition.	Show particulars in accord with Reg 8(2), Schedule 6.I and this CODE OF PRACTICE.

Table 1 Summary of classification and labelling requirements

Part II Substances dangerous for conveyance by road

Statutory Instrument	*Type of substance*	*Classification*	*Labelling*
Classification Packaging and Labelling of Dangerous Substances Regulations 1984	Substance specified in Part IA of the Approved List** as dangerous for conveyance	By Reg 6(2), that shown in column 6 of Part IA of the Approved List	Show particulars in accord with Reg 9(2), Schedule 7, Part IA of the Approved List, and when Reg 9(2)(c) applies also in accord with this CODE OF PRACTICE
(CPL)	Article specified in Part IC of the Approved List as dangerous for conveyance	By Reg 6(3), that shown in column 6 of Part IC of the Approved List	Show particulars in accord with Reg 9(2), Schedule 7, Part IC of the Approved List and when Reg 9(2)(c) applies also in accord with this CODE OF PRACTICE
	Any other substance	By Reg 6(4), in accord with the characteristic properties specified in column 1 of Part I of Schedule 2 and this CODE OF PRACTICE	Show particulars in accord with Reg 9(2), Schedule 7 and this CODE OF PRACTICE

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* Under Regulation 16(9) of the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984, Regulation 4(1)(c)(ii) to the Notification of New Substances Regulations 1982 requires recommendations for labelling in accordance with Schedule 3 as extended by Regulation 8 of the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984.

** Approved List means the list published by the Health and Safety Commission entitled *Information Approved for the Classification, Packaging and Labelling of Dangerous Substances.* The status of the Approved List is different from that of an Approved Code of Practice. Failure to adopt the classification and labelling detail given for a substance specified in the Approved List is a breach of the corresponding Regulation. Failure to comply with the guidance given in an Approved Code of Practice is not an offence in itself (see Introduction).

Part 1 Classification and labelling for supply

Outline

1 In order to classify and then label a substance which is dangerous for supply it is first necessary to identify each of the physico-chemical and toxicological properties which may constitute a hazard during normal handling or use.

2 The labelling for supply is intended to provide a primary means by which persons at work and the general public are given essential information about dangerous substances. It draws the attention of persons using dangerous substances to their inherent danger and because of that draws attention to more comprehensive product information on safety and use available in other forms. In that sense, the labelling supplements the requirements of Section 6 of the Health and Safety at Work etc Act 1974 (HSW Act).

3 The label should take account of all the potential hazards of a substance when in the form in which it is supplied, but not necessarily in any different form in which it may ultimately be used, as for example diluted. The most severe physico-chemical hazard and most severe toxicological hazard, if any, are highlighted by symbols and general indications of risk, such hazards and those arising from other dangerous properties are specified in standard risk phrases, and safety phrases give advice on ncessary precautions. The label is completed with the designation of the substance, in accordance with Part I of Schedule 6 of the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984, and the name and address of the manufacturer, importer, wholesaler or other supplier of the substance.

4 The classification and labelling details derived in accordance with the guidance in this Code of Practice may need to be revised from time to time as further information on potential hazards becomes available, as more specific rules are laid down by Regulation or as the Approved List is revised.

General principles

5 New substances notified under the Notification of New Substances Regulations 1982 are to be classified and the labelling determined on the basis of the results obtained from the tests carried out as a requirement of the notification procedure. The guidance given below is related to test methods described in the Codes of Practice, COP 9 and COP 10.

6 As far as other substances are concerned, the data required to determine the classification and the labelling details may be derived from a number of different sources - for example: previous test data, information obtained from testing carried out in connection with Section 6 of the Health and Safety at Work etc Act 1974, information required in relation to international rules on the transport of dangerous goods, information obtained from reference works or from the literature, or information derived from practical experience. The guidance given below is directly applicable when the data has been obtained from test procedures equivalent to those described in COP 9 and COP 10, but in other cases, when the data has been obtained from other test procedures or other sources, it is necessary to assess the available information in such a way as to determine whether the substance in question has the characteristic properties specified in column 1 of Part I of Schedule 1 to the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984. Such assessments are made by a reference to the guidance given below in conjunction with the test procedures described in COP 9 and COP 10 and with any criteria given in those descriptions. The characteristic properties of mixtures may when appropriate be assessed from the knowledge of the properties of the component substances.

7 In considering whether a substance has to be classified as explosive, oxidizing, extremely flammable, highly flammable or flammable and ascribed the appropriate risk phrases, the following principles shall apply.

(a) The test methods described in COP 9 for the determination of these properties serve to give more specific meaning to definitions (a) to (e) in Schedule 2 of the Notification of New Substances Regulations 1982 and to the corresponding definitions in column 1 of Part I of Schedule 1 to the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984. Criteria for classification are related to the test procedures and given as interpretations of results obtained.

(b) If adequate information is available to demonstrate that the physico-chemical properties of a substance (apart from an organic peroxide) are different in practice from those which are or might be suggested by the test procedures described in COP 9, then the substance may be classified according to the hazard, if any, it is likely to present to those handling the substance or to other persons.

(c) Organic peroxides are to be classified as dangerous on the basis of their structure, e.g. R-O-O-H, R_1-O-O-R_2. They should be classified as oxidizing, and ascribed a risk phrase in accordance with para 11 below, unless:

(i) tests such as those described in COP 9 for explosive properties show the organic peroxide, in the form in which it is to be supplied, to have explosive properties, see para 10 below;

(ii) the organic peroxide is so diluted or phlegmatised that it has neither explosive, oxidizing nor flammable properties.

(d) Substances in the form of aerosols shall be subject to the flammability criteria set out in Part III of Schedule 1 to the Classification Packaging and Labelling of Dangerous Substances Regulations 1984, irrespective of the guidance given below in paras 12 to 14.

8 In considering whether a substance has to be classified as very toxic, toxic or harmful and ascribed the appropriate risk phrases, the following principles should apply:-

(a) Classification is related to both the acute and the long term effects of a substance whether arising from a single exposure or from repeated or prolonged exposure.

(b) A substance should generally be classified in accordance with the acute toxicity of the marketed product, expressed as LD_{50} or LC_{50} as determined by tests on experimental animals. Reference values used in paras 15 to 17 below are taken from Part II of Schedule 2 to the Notification of New Substances Regulations 1982 or from Part II of Schedule 1 to the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984. If there is evidence which suggests the existence of effects other than the acute effects indicated by experiments with animals, e.g. carcinogenic, mutagenic, teratogenic, allergenic, sub-acute or chronic effects, then the substance should be classified according to the magnitude of these effects.

(c) If adequate evidence is available to show that the toxic effect of a substance on man is, or is likely to be different in practice from that suggested by the experimental results obtained in animal tests then that substance should be classified according to its toxicity to man.

(d) It is equally important that experimental results obtained in any animal tests which are to be used as a basis for classification reflect in an appropriate way the risks to man.

9 In classifying a substance it is necessary to consider each of the characteristic properties in turn in accordance with the criteria set out below. Risk phrases must be chosen so as to ensure that the specific nature of the potential dangers identified in classification are properly expressed on the label; in that respect it is again necessary to consider all of the criteria set out in these paragraphs.

Criteria for classification and choice of risk phrases

Explosive

10 Substances shall be classified as explosive and assigned the corresponding symbol and indication of general nature of risk in accordance with the results of the tests given in COP 9 and in so far as they are explosive as supplied. One risk phrase shall be assigned, as follows:

R2 *Risk of explosion by shock, friction, fire or other sources of ignition*
- substances including certain organic peroxides, other than those set out below.

R3 *Extreme risk of explosion by shock, friction, fire or other sources of ignition*
- substances which are particularly sensitive such as picric acid salts and certain undiluted organic peroxides such as dibenzoyl peroxide.

Oxidizing

11 Substances shall be classified as oxidizing and assigned the corresponding symbol and indication of general nature of risk in accordance with the results of the tests given in COP 9. One risk phrase shall be assigned, as follows:

R11 *Highly flammable*
- organic peroxides which have flammable properties even when not in contact with other combustible material.

R8 *Contact with combustible material may cause fire*
- other oxidizing substances which may cause fire or enhance the risk of fire when in contact with combustible material.

R9 *Explosive when mixed with combustible material*
- other substances which become explosive when mixed with combustible materials eg certain chlorates.

Extremely flammable

12 Substances shall be classified as extremely flammable and assigned the corresponding symbol and indication of general nature of risk in accordance with the results of the tests given in Part IV of Schedule 1 to the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984 or where appropriate in COP 9. The risk phrase shall be assigned as follows:

R12 *Extremely flammable*
- liquid substances which have a flash point lower than 0°C and a boiling point (or in case of a boiling range the initial boiling point) lower than or equal to 35°C.

Highly flammable

13 Substances shall be classified as highly flammable and assigned the corresponding symbol and indication of general nature of risk in accordance with the tests referred to in para 12 above or otherwise given in COP 9. Risk phrases shall be assigned as follows:

R17 *Spontaneously flammable in air*
- substances which may become hot and finally catch fire in contact with air at ambient temperature without any input of energy.

R11 *Highly flammable*
- solid substances which may readily catch fire after brief contact with a source of ignition and which continue to burn or to be consumed after removal of the source of ignition.
- liquid substances having a flash point below 21°C but which are not extremely flammable.

R12 *Extremely flammable*
- gaseous substances which are flammable in air at normal pressure.

R13 *Extremely flammable liquefied gas*
- gaseous substances which are flammable in air at normal pressure when supplied in liquefied form.

R15 *Contact with water liberates highly flammable gases*
- substances which, in contact with water or damp air, evolve highly flammable gases in dangerous quantities, at a minimum rate of 1litre/kg h.

Flammable

14 Substances shall be classified as flammable in accordance with the results of the tests referred to in para 12 above. The indication of general nature of risk or risk phrase, as the case may be, shall be assigned as follows:

R10 *Flammable*
- liquid substances having a flash point equal to or greater than 21°C, and less than or equal to 55°C.

Except that a liquid which when tested at 55°C in the manner described in Schedule 2 to the Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972, or a preparation which it is otherwise shown in practice, does not support combustion need not be classified as flammable.

Very toxic

15 Substances shall be classified as very toxic and assigned the corresponding symbol, indication of general nature of risk and risk phrases in accordance with the following criteria:

R28 *Very toxic if swallowed*
- acute toxicity results:
  LD_{50} oral, rat $\leq$ 25 mg/kg

R27 *Very toxic in contact with skin*
- acute toxicity results:
  LD_{50} dermal, rat or rabbit $\leq$ 50 mg/kg

R26 *Very toxic by inhalation*
- acute toxicity results:
  LC_{50} inhalation, rat $\leq$ 0.5 mg/litre/4h

R30* *Danger of very serious irreversible effects*
- strong evidence that irreversible damage other than due to carcinogenic, mutagenic or teratogenic effects (see paras 21 to 24) is likely to be caused by a single exposure by an appropriate route, generally in the above-mentioned dose range and having regard for the principles outlined in para 8.

Toxic

16 Substances shall be classified as toxic and assigned the corresponding symbol, indication of general nature of risk and risk phrases in accordance with the following criteria:

R25 *Toxic if swallowed*
- acute toxicity results:
  LD_{50} oral, rat : $25 < LD_{50} \leq 200$ mg/kg

R24 *Toxic in contact with skin*
- acute toxicity results:
  LD_{50} dermal, rat or rabbit : $50 < LD_{50} \leq 400$ mg/kg

R23 *Toxic by inhalation*
- acute toxicity results:
  LC_{50} inhalation, rat : $0.5 < LC_{50} \leq 2$ mg/litre/4h

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* R26, 27 or 28 is also to be assigned to indicate route of administration/exposure.

R39* *Danger of very serious irreversible effects*
- strong evidence that irreversible damage other than due to carcinogenic, mutagenic or teratogenic effects (see paras 21 to 24) is likely to be caused by a single exposure by an appropriate route, generally in the above-mentioned dose range and having regard for the principles outlined in para 8.

R48* *Danger of serious damage to health by prolonged exposure*
- Serious damage (clear functional disturbance or morphological change which has toxicological significance) is likely to be caused by repeated or prolonged exposure, by an appropriate route, at levels significantly lower than those quoted against R48 in para 17 below and having regard for the principles outlined in para 8.

Harmful

17 Substances shall be classified as harmful and assigned the corresponding symbol, indication of general nature of risk and risk phrases in accordance with the following criteria:

R22 *Harmful if swallowed*
- acute toxicity results:
  LD$_{50}$ oral, rat : $200 < LD_{50} \leq 2000$ mg/kg

R21 *Harmful in contact with skin*
- acute toxicity results:
  LD$_{50}$ dermal, rat or rabbit : $400 < LD_{50} \leq 2000$ mg/kg

R20 *Harmful by inhalation*
- acute toxicity results:
  LC$_{50}$ inhalation, rat : $2 < LC_{50} \leq 20$ mg/litre/4h

R40* *Possible risk of irreversible effects*
- strong evidence that irreversible damage other than due to carcinogenic, mutagenic or teratogenic effects (see paras 21 to 24) is likely to be caused by a single exposure by an appropriate route, generally in the above-mentioned dose range and having regard for the principles outlined in para 8.

R48* *Danger of serious damage to health by prolonged exposure*
- serious damage (clear functional disturbance or morphological change which has toxicological significance) is likely to be caused by repeated or prolonged exposure by an appropriate route, at levels of the order of (see also para 8):

  oral, rat $\leq$ 50 mg/kg (body weight) / day†
  dermal, rat or rabbit $\leq$ 100 mg/kg (body weight) / day†
  inhalation, rat $\leq$ 0.5 mg/l, 6h/day†

  These guide values can apply directly when severe lesions have been observed in a sub-chronic (90 days) toxicity study, but also serve as a guide when interpreting the results of sub-acute (28 days) or chronic (2 years) toxicity tests.

R42 *May cause sensitization by inhalation*
- if practical evidence is available which shows a substance to be capable of inducing a sensitization reaction in humans by inhalation, at a greater frequency than would be expected from the response of a normal population.

Corrosive

18 A substance shall be classified as corrosive and assigned the corresponding symbol and indication of general nature of risk if, when applied to healthy intact animal skin, it produces full thickness destruction of skin tissue on at least one animal during a test for skin irritation such as that described in COP 10. Substances which have predictable corrosive properties, eg strongly acidic or alkaline reactions, need not be tested in that way but may be classified on the basis of the prediction. The risk phrase shall be assigned as follows:

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* R20, R21 or R22 is also to be assigned to indicate route of administration/exposure

† These values are not intended to influence in any way the choice of dose levels in carrying out tests, when these are appropriate.

R35 *Causes severe burns*
- if when applied to healthy intact animal skin, full thickness destruction of skin tissue occurs as a result of up to 3 minutes exposure, or if this result can be predicted.

R34 *Causes burns*
- if when applied to healthy intact animal skin, full thickness destruction of skin tissue occurs as a result of up to 4 hours exposure, or if this result can be predicted.

Irritant

19 A non-corrosive substance shall be classified as irritant and assigned the corresponding symbol, indication of general nature of risk and risk phrases if it causes, or is likely to cause, inflammation of the skin or ocular lesions in accordance with the following criteria.

R38 *Irritating to skin*
- if when applied to healthy intact animal skin for up to 4 hours, significant inflammation is caused and which is present 24 hours or more after the end of the exposure period.
  Inflammation is significant if it corresponds to the following values determined on the rabbit according to the skin irritation test described in COP 10: either -

  (a) the mean value of the score for either erythema and eschar formation or oedema formation, calculated over all animals tested, is 2 or more; *or*

  (b) In the case where the COP 10 test has been completed using 3 animals, either erythema and eschar formation or oedema formation equivalent to a mean value of 2 or more calculated for each animal separately has been observed in 2 or more animals.

  In both cases, all scores at each of the reading times (24, 48, 72 h) for an effect should be used in calculating the respective mean values.

R43 *May cause sensitization by skin contact*
- if practical experience shows a substance to be capable of inducing a sensitization reaction in a substantial number of persons by skin contact, or on the basis of a positive response in experimental animals;
  In the case of the test method for skin sensitization detailed in COP 10 or in the case of other adjuvant-type test methods a response in at least 30% of the animals is considered positive. For any other test method a response in at least 15% of the animals is considered positive.

R36 *Irritating to eyes*
- if when applied to the eye of an animal, significant ocular lesions occur within 72 hours after exposure and persist for at least 24 hours. Ocular lesions are significant if they correspond to the following values determined on the rabbit according to the eye irritation test described in COP 10: either -

  (a) the mean value of the scores for each type of lesion, calculated over all animals tested, is one of the following:

  - cornea opacity $2 \leq$ value < 3
  - iris lesion $1 \leq$ value ≤ 1.5
    redness of conjunctivae ≥ 2.5
  - oedema of conjunctivae (chemosis) ≥ 2; or

(b) in the case where the COP 10 test has been completed using 3 animals, a lesion equivalent to one of the mean values quoted below, but calculated for each animal separately, has been observed in 2 or more animals:

- cornea opacity	$2 \leq \text{value} < 3$
- iris lesion	$1 \leq \text{value} < 2$
- redness of conjunctivae	≥ 2.5
- oedema of conjunctivae (chemosis)	≥ 2

In both cases all scores at each of the reading times (24, 48, 72 h) for an effect should be used in calculating the respective values.

R41* *Risk of serious damage to eyes*
- if when applied to the eye of the animal severe ocular lesions are caused and which are present 24 hours or more after instillation of the test material.

Ocular lesions are severe if the means of the scores have any of the values:

cornea opacity equal to or greater than 3; iris lesion greater than 1.5. The same shall be the case where the test has been completed using three animals if these lesions, on two or more animals, have any of the values: cornea opacity equal to or greater than 3; iris lesion equal to 2.

The following risk phrase should also be assigned when appropriate:

R37 *Irritating to respiratory system*
- substances which cause serious irritation to the respiratory system, based normally on practical observation.

Other properties

20 Additional risk phrases shall be assigned to substances classified by virtue of paras 10-19, in accordance with the following criteria:

R1 *Explosive when dry*
For explosive substances supplied in solution or in a wetted form; e.g. nitrocellulose with more than 12.6% nitrogen.

R4 *Forms very sensitive explosive metallic compounds*
For substances which may form sensitive explosive metallic derivatives e.g. picric acid, styphnic acid.

R5 *Heating may cause an explosion*
For thermally unstable substances not classified as explosive, e.g. perchloric acid > 50%.

R6 *Explosive with or without contact with air*
For substances which are unstable at ambient temperatures, e.g. acetylene.

R7 *May cause fire*
For reactive substances e.g. fluorine, sodium hydrosulphite.

R14 *Reacts violently with water*
For substances which react violently with water; e.g. acetyl chloride, alkali metals, titanium tetrachloride.

R16 *Explosive when mixed with oxidizing substances*
For substances which react explosively with an oxidizing agent; e.g. red phosphorus.

R18 *In use, may form flammable/explosive vapour-air mixture*
For preparations not in themselves classified as flammable, which contain volatile components which are flammable in air.

R19 *May form explosive peroxides*
For substances which may form explosive peroxides during storage e.g. diethyl ether, 1,4-dioxan.

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*The use of R34 or R35 precludes the use of R41

R29 *Contact with water liberates toxic gas*
For substances which in contact with water or damp air, evolve very toxic/toxic gases in potentially dangerous amounts; eg aluminium phosphide, phosphorus penta sulphide.

R30 *Can become highly flammable in use*
For preparations not in themselves classified as flammable, which may become flammable due to the loss of non-flammable volatile components.

R31 *Contact with acids liberates toxic gas*
For substances which react with acids to evolve toxic gases in dangerous amounts; e.g. sodium hypochlorite, barium polysulphides. For substances used by members of the general public S, 50 (*do not mix with ....(to be specified by the manufacturer)*) would be more suitable.

R32 *Contact with acids liberates very toxic gas*
For substances which react with acids to evolve very toxic gases in dangerous amounts; e.g. salts of hydrogen cyanide, sodium azide. For substances used by members of the general public, S 50 (*do not mix with ....(to be specified by the manufacturer)*) would be more suitable.

R33 *Danger of cumulative effects*
For substances likely to accumulate in the human body and which cause some concern, but not sufficient to justify the use of R48. Previously assigned to substances in Part 1A of the Approved List and preparations which were likely to cause damage to health by prolonged exposure or which were likely to be retained and then accumulated within the human body. Now to be progressively replaced when appropriate by R48.

R44 *Risk of explosion if heated under confinement*
For substances not in themselves classified as explosive in accordance with para 10 but which may nevertheless display explosive properties in practice if heated under sufficient confinement. For example, certain substances which would decompose explosively if heated in a steel drum, do not show this effect if heated in less strong containers.

Additional criteria for classification and choice of risk phrases concerning carcinogenic, mutagenic or teratogenic effects.

21 The criteria which follow are applicable to substances, other than preparations which may be categorised as:

(a) carcinogenic of:

Category 1
Substances known to be carcinogenic to man. There is sufficient evidence to establish a causal asociation between human exposure to a substance and the development of cancer; or

Category 2
Substances which should be regarded as if they are carcinogenic to man. There is sufficient evidence to provide a strong presumption that human exposure to a substance may result in the development of cancer, generally on the basis of
- appropriate long term animal studies
- other relevant information; or

Category 3
Substances which cause concern for man owing to possible carcinogenic effects but in respect of which the available information is not adequate for making a satisfactory assessment. There is some evidence from appropriate animal studies, but this is insufficient to place the substance in Category 2.

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(b) mutagenic of:

Category 1

Substances known to be mutagenic to man. There is sufficient evidence to establish a causal association between human exposure to a substance and heritable genetic damage; or

Category 2

Substances which should be regarded as if they are mutagenic to man. There is sufficient evidence to provide a strong presumption that human exposure to the substance may result in the development of heritable genetic damage, generally on the basis of:
- appropriate animal studies
- other relevant information; or

Category 3

Substances which cause concern for man owing to possible mutagenic effects but in respect of which the available information does not satisfactorily demonstrate heritable genetic damage. There is evidence from appropriate mutagenicity studies, but this is insufficient to place the substance in Category 2.

(c) teratogenic of:

Category 1

Substances known to be teratogenic to man. There is sufficient evidence to establish a causal association between human exposure to a substance and subsequent non-heritable birth defects in offspring; or

Category 2

Substances which should be regarded as if they are teratogenic to man. There is sufficient evidence to provide a strong presumption that human exposure to the substance may result in non-heritable birth defects in offspring, generally on the basis of:
- appropriate animal studies
- other relevant information

22 Such substances shall be classified and assigned the corresponding symbol, indication of general nature of risk and risk phrase as:

(a) carcinogenic substances of:
  (i) Category 1 and 2 at least as toxic with
    R45 *May cause cancer*
  (ii) Category 3 as harmful with
    R40 *Possible risk of irreversible effects*

(b) mutagenic substances of:
  (i) Category 1 at least as toxic, category 2 as harmful with
    R46 *May cause heritable genetic damage*
  (ii) Category 3 as harmful with
    R40 *Possible risk of irreversible effects*

(c) teratogenic substances of:
    Category 1 at least as toxic, category 2 as harmful with
    R47 *May cause birth defects*

23 However, notwithstanding the guidance given in paragraph 22 and until such time as the substance is specified in Part 1A of the Approved List as provided for in Regulation 4 of the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984, it shall be sufficient in any case where there is information to suggest that a substance should be classified and labelled in accordance with those criteria if:

(a) the substance is classified at least as harmful and assigned the corresponding symbol and indication of general nature of risk, and

(b) is assigned the risk phrase
R40 *Possible risk of irreversible effects*

24 Furthermore, in order to expedite the inclusion of that substance in Part 1A of the Approved List the manufacturer or his representative is requested to send to the Health and Safety Executive a document summarising the information on which that classification was based, unless such information has already been submitted to an authority nominated for that purpose in another Member State of the European Communities in which the substance has been supplied. The summary document should include a bibliography containing all relevant references and may also include any relevant unpublished data.

Choice of safety phrases

25 Safety phrases shall be assigned to substances in accordance with the following guidance:

S1 *Keep locked up*
- Recommended for very toxic and toxic substances likely to be used by members of the general public.

S2 *Keep out of reach of children*
- obligatory for all dangerous substances likely to be used by members of the general public or likely to be used in places to which the general public have access, unless there is no reason to fear any danger particularly to children.

S3 *Keep in a cool place*
- Obligatory for organic peroxides unless S47 is used;
- Recommended for other dangerous substances having a boiling point of ≤40°C.

S4 *Keep away from living quarters*
- Normally limited to very toxic and toxic substances when desirable to supplement S13; for example when there is an inhalation risk and the substance should be stored away from living quarters. The advice is not intended to preclude proper use of the substance or preparation in living quarters.

S5 *Keep contents under ......(appropriate liquid to be specified by the manufacturer)*
- Normally limited to particular spontaneously flammable solid substances e.g. sodium, potassium or white phosphorous.

S6 *Keep under ......(inert gas to be specified by the manufacturer)*
- Normally limited to particular dangerous substances which must be kept under an inert atmosphere, e.g. certain organo-metallic compounds.

S7 *Keep container tightly closed*
- Obligatory for organic peroxides in the combination of S 3/7/9.
- Recommended for substances which can give off very toxic, toxic, harmful, extremely flammable or highly flammable vapours, those which on contact with moisture give off highly flammable gases and highly flammable solids.

S8 *Keep container dry*
- Normally limited to substances which may react violently with water and those which on contact with water liberate highly flammable, very toxic or toxic gases; when necessary to reinforce warnings given by R14, R15 in particular and R29.

S9 *Keep container in a well-ventilated place*
- Obligatory for organic peroxides in the combination S 3/7/9.
- Recommended for volatile substances which may give off very toxic, toxic or harmful vapours, and for extremely flammable or highly flammable liquids or gases.

S12 *Do not keep the container sealed*

- Normally limited to substances which will by giving off gases or vapours be liable to burst the container.

S13 *Keep away from food, drink and animal feeding stuffs*

- Recommended for very toxic, toxic and harmful substances likely to be used by members of the general public.

S14 *Keep away from ......(incompatible materials to be indicated by the manufacturer)*

- Obligatory for and normally limited to organic peroxides.
  However may be useful in exceptional cases when incompatibility is likely to produce a particular risk.

S15 *Keep away from heat*

- Normally limited to particular substances which may decompose or react spontaneously under the effect of heat, eg monomers. But not assigned if risk phrases R2, R3 and/or R5 have already been applied.

S16 *Keep away from sources of ignition - no smoking*

- Recommended for extremely flammable or highly flammable liquids and gases but not assigned if risk phrases R2, R3 and/or R5 have already been applied.

S17 *Keep away from combustible material*

- Available for particular substances which may form explosive or spontaneously flammable mixtures with combustible material; e.g. to emphasise R8 and R9.

S18 *Handle and open container with care*

- Normally limited to substances liable to produce an overpressure in the container or those which may form explosive peroxides. When there is risk of damage to the eyes and/or when the substances are likely to be used by members of the general public.

S20 *When using do not eat or drink*

- Normally limited to particular very toxic, toxic and corrosive substances (e.g. arsenic and arsenic compounds; fluoroacetates); more especially when any of these are likely to be used by members of the general public.

S21 *When using do not smoke*

- Normally limited to particular substances which produce toxic products on combustion (e..g. halogenated compounds).

S22 *Do not breathe dust*

- Recommended for dangerous solids which are liable to form inhalable dusts, and when it is necessary to draw the attention of the user to inhalation risks not mentioned in the risk phrases which have been ascribed. However may be used in exceptional cases to emphasise such risk phrases, in particular to emphasise R42.

S23 *Do not breathe gas/fumes/vapour/spray (appropriate wording to be specified by the manufacturer*

- Recommended for liquid or gaseous dangerous substances when it is necessary to draw the attention of the user to inhalation risks not mentioned in the risk phrases which have to be ascribed. However may be used in exceptional cases to emphasise such risk phrases, in particular to emphasise R42.
- Recommended for substances in the form of aerosols which are likely to be used by members of the general public.

S24 *Avoid contact with skin*

- Recommended when it is necessary to draw the attention of the user to skin contact risks, not mentioned in the risk phrases which have to be ascribed. However, may be used in exceptional cases to emphasise such risk phrases, in particular to emphasise R43.

S25 *Avoid contact with eyes*
- Normally limited to particular corrosive or irritant substances, ie when it is considered essential to emphasise the risk to eyes denoted by use of R34; R35; R36 or R41. Thus important if these substances are likely to be used by members of the general public and eye or face protection may not be available.

S26 *In cases of contact with eyes, rinse immediately with plenty of water and seek medical advice*
- Obligatory for corrosive substances and those to which R41 has already been ascribed.
- Recommended for irritant substances to which R36 has already been ascribed.

S27 *Take off immediately all contaminated clothing*
- Obligatory for organic peroxides.
- Recommended for very toxic and toxic substances which are easily absorbed by the skin and for corrosive substances unless safety phrase S36 can be considered sufficient by itself.

S28 *After contact with skin, wash immediately with plenty of ...... (to be specified by the manufacturer)*
- Recommended for very toxic, toxic or corrosive substances, in particular when water is not the most appropriate rinsing fluid.

S29 *Do not empty into drains*
- Recommended for those extremely or highly flammable liquids which are immiscible with water. The intention is to avoid accidents (e.g. fire, explosion) and not to emphasise general pollution problems.

S30 *Never add water to this product*
- Normally limited to particular substances which react violently with water (e.g. sulphuric acid) and may be used, as appropriate to give the clearest possible information, either to emphasise R14 or as an alternative to R14.

S33 *Take precautionary measures against static discharges*
- Recommended for extremely or highly flammable substances used in industry which do not absorb moisture. Virtually never used for substances supplied for use by members of the general public.

S34 *Avoid shock and friction*
- Obligatory for, and normally limited to, organic peroxides classified as explosive.

S35 *This material and its container must be disposed of in a safe way*
- Obligatory for explosive substances other than organic peroxides.
- Recommended for very toxic and toxic substances, particularly when such substances are likely to be used by members of the general public.

S36 *Wear suitable protective clothing*
- Recommended for substances used in industry which are:-
  - very toxic, toxic or corrosive, and/or
  - harmful and easily absorbed by the skin and/or
  - liable to damage health by prolonged exposure.

S37 *Wear suitable gloves*
- Recommended for very toxic, toxic and corrosive substances when S36 is not used (e.g. when the substance is likely to be used by members of the general public).
- Recommended for organic peroxides as combination S37/39.
- Recommended for substances irritating to the skin, particularly when R38 is not shown on the label.

S38 *In case of insufficient ventilation wear suitable respiratory equipment*
- Normally limited to particular very toxic or toxic substances used in industry or in agriculture.

S39 *Wear eye/face protection*

- Recommended for organic peroxides as the combination S37/39.
- Recommended for the corrosive substances and irritants which give rise to risk of serious damage to the eyes, in particular when there is a risk of splashing.
- Normally limited to exceptional cases for very toxic and toxic substances, where there is a risk of splashing and they are likely to be easily absorbed by the skin.

S40 *To clean the floor and all objects contaminated by this material use ...... (to be specified by the manufacturer)*

- Normally limited to those dangerous substances for which water is not considered to be a suitable cleansing agent (e.g. where absorption by powdered material, dissolution by solvent etc is necessary) and where it is important for health and/or safety reasons to provide a warning on the label.

S41 *In case of fire and/or explosion do not breathe fumes*

- Normally limited to particular dangerous substances which on combustion give off very toxic or toxic gases.

S42 *During fumigation/spraying wear suitable respiratory equipment (appropriate wording to be specified by the manufacturer)*

- Normally limited to particular substances intended for such use but which may endanger the health and safety of the user unless proper precautions are taken.

S43 *In case of fire use ...... (indicate in the space the precise type of fire-fighting equipment. If water increases the risk add ...... never use water)*

- Obligatory for substances which in contact with water or damp air, evolve highly flammable gases
- Recommended for extremely flammable, highly flammable and flammable substances particularly when they are immiscible with water.

S44 *If you feel unwell seek medical advice (show the label where possible)*

- Obligatory for toxic substances used in industry and not likely to be used by members of the general public.

S45 *In case of accident or if you feel unwell seek medical advice immediately (show the label where possible)*

- Obligatory for very toxic substances and for toxic substances likely to be used by members of the general public.

S46 *If swallowed, seek medical advice immediately and show this container or label*

- Obligatory for all dangerous substances not ascribed S44 or S45 which are likely to be used by members of the general public, unless there is no reason to fear any danger from swallowing, particularly by children.

S47 *Keep at temperature not exceeding .....°C (to be specified by the manufacturer)*

- Normally limited to particular substances which become unstable at a certain temperature (e.g. certain organic peroxides).

S48 *Keep wetted with ...... (appropriate material to be specified by the manufacturer)*

- Applicability normally limited to particular substances which may become very sensitive to sparks, friction or impact if allowed to dry (e.g. nitrocelluloses).

S49 *Keep only in the original container*

- Normally limited to substances sensitive to catalytic decomposition (e.g. certain organic peroxides).

S50 *Do not mix with ...... (to be specified by the manufacturer)*

- Recommended for substances likely to be used by members of the general

- public, which may react with the specified product to evolve very toxic or toxic gases, when it is a better alternative to R31 or R32.
- Obligatory with certain peroxides which may give violent reaction with accelerators or promoters.

S51 *Use only in well-ventilated areas*

- Recommended for substances likely to or intended to produce vapours, dusts, sprays, fumes, mists etc which give rise to inhalation risks or to a fire or explosion risk; when use of S38 would not be appropriate. Thus important when such substances are likely to be used by members of the general public.

S52 *Not recommended for interior use on large surface areas*

- Recommended when damage to health is likely to be caused by prolonged exposure to volatile very toxic, toxic and harmful substances (or preparations containing them) by reason of their volatilisation from large treated surfaces in the home or other enclosed places where persons congregate.

Labelling proposal

26 The proposed labelling for a substance classified in accordance with the guidance given above should be derived from the total number of symbols and/or general indications of risk, risk phrases and safety phrases assigned.

27 A similar procedure applies in the case of other substances classified in accordance with particular provisions such as those specified for pesticide preparations, solvents and paints *et al* in Schedules 3, 4 and 5 to the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984. The total number of symbols and/or general indications of risk will have been assigned in following those provisions. Some risk phrases follow directly from the assignment of those symbols and general indications of risk but other risk and safety phrases should be assigned when necessary for example on the basis of those which would be applicable to the constituent which most contributes to the dangerous properties of a preparation.

28 In some instances, it may be necessary to include specific safety phrases such as those required under Regulation 12 or, for pesticides, under para 9 of Schedule 6 to the Classification, Packaging and Labelling Regulations.

29 When more than one symbol and/or general indication of risk has been assigned to a substance, a final choice is made so that the most severe health hazard, if any, and the most severe fire or explosion hazard, if any, are indicated. The choice is further detailed in para 7(2) of Schedule 6 to the Classification, Packaging and Labelling Regulations.

30 Although the final choice of the most appropriate risk and safety phrases is primarily governed by the need to give all necessary information, consideration should also be given to the clarity and impact of the label. With clarity in mind, the necessary information should be expressed in a minimum number of phrases. Generally up to four risk phrases and up to four safety phrases will be sufficient; for this purpose the combination phrases specified in Parts IV and V of the Approved List are considered as single phrases. Whilst it may be possible to reduce the total number of phrases for substances classified for example as harmful, irritant or flammable, more than four risk and four safety phrases should only be specified in very particular cases.

31 When more than four risk phrases have been assigned to a substance, it is generally possible to eliminate phrases which refer to the lowest degree of hazard providing that the overall effectiveness of the warning is not thereby reduced. It is frequently found that certain risk phrases are rendered superfluous by a suitable choice of safety phrase. The risk phrases which correspond to the symbols indicated on the label are obligatory except that the risk phrases ‘extremely flammable’, ‘highly flammable’ or ‘flammable’ need not be shown where they repeat the wording of the general indication of risk.

32 The final choice of safety phrases must have regard to the risk phrases indicated on the label and to the intended use of the substance;

- safety phrases which give obvious advice in relation to risk phrases are generally omitted from the label unless used to give particular emphasis to a specific warning;
- certain safety phrases eg S2 have particular relevance to substances intended to be used by members of the general public, other phrases have particular relevance to persons at work. Phrases should be chosen with the intended use in view;
- particular attention must be given, in the choice of safety phrases, to the foreseen conditions of use of certain substances, for example, spraying or other aerosol effects.

Part 2
Classification and labelling for conveyance by road

Outline

33 This part is concerned with substances dangerous for conveyance by road which are to classified and/or labelled in accordance with Regulations 6(4) and 9, respectively, of the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984; reference to particular Schedules made in this part are references to the corresponding Schedules of those Regulations unless otherwise specified. The guidance is based on the United Nations Recommendations for the Transport of Dangerous Goods but, following the exceptions made in Regulation 3, does not extend to the explosive, infectious or radio-active properties of substances.

34 In order to classify and then label a substance which is dangerous for conveyance it is first necessary to identify each of the physico-chemical and toxicological properties which may constitute a hazard during conveyance by road; more particularly in the event of an accident, spillage or fire.

35 The most hazardous of the characteristic properties of a substance is highlighted in labelling by means of a hazard warning sign. The other dangerous properties are taken into account, when appropriate, in additional information to be shown on the label or on a separate sheet concerning the nature of the dangers to which the substance may give rise and the emergency action that should be taken. The label is completed with the designation of the substance and substance identification number (if any), both determined in accordance with Schedule 7, and with the name and address or telephone number or both of some person able to give expert advice.

36 The labelling required in the case of certain substances may need to be shown in addition to separate labelling relating to explosive or radio-active properties or to substances containing disease-producing micro-organisms laid down, from time to time, in separate provisions. For example, certain organic peroxides which retain explosive properties as packaged and prepared for conveyance by road should be labelled as explosive under the Classification and Labelling of Explosives Regulations 1983 and as an organic peroxide in accordance with the guidance here given.

37 The data used to determine the classification and labelling of substances dangerous for supply, see paras 5 and 6, may be used in the same way to determine the classification and labelling of substances dangerous for conveyance by road in accordance with the guidance in this Part.

General principles

38 A substance which is a gas as defined need only be further classified as flammable or toxic. A gas exhibiting both flammable and toxic characteristics should be classified as a toxic gas. A gas exhibiting neither toxic nor flammable characteristics should be classified as a non-flammable compressed gas.

39 Organic peroxides are a special type of oxidizing substance which normally exhibit some degree of instability and should be classified as organic peroxides according to their known chemical structure.

40 Substances known from experience to present toxic or corrosive risks to man should be so classified, but in the absence of human experience should be provisionally classified according to the results of experiments on the exposure of animals.

41 Each of the criteria for classification given below should be considered in turn in order to derive the most appropriate hazard warning sign and the additional particulars relating to danger to be shown on the label. In the case of a gas or an organic peroxide, the corresponding hazard warning signs are assigned irrespective of any other properties those substances may exhibit. In other cases it may be necessary to refer to the precedence table in the Appendix to determine which of two or more properties should be considered the most hazardous and thus which hazard warning sign should be assigned. For this purpose and where appropriate, the criteria have been ascribed the reference numbers (e.g. for flammable liquids: 3: I, II or III) used in the Appendix. The reference numbers correspond to the class, division and packing group numbers used in the United Nations Recommendations.

Criteria for classification

Gases

42 A gas is defined as any substance which has a critical temperature below 50°C or which at 50°C has a vapour pressure of more than 3 bar, and is further defined as a compressed gas when compressed to a pressure in excess of 500 mbar or is in liquefied form. Classification as flammable gas, toxic gas or non-flammable compressed gas depends initially on classification as a gas.

43 Flammable or toxic gases are subject to the Regulations whether compressed or otherwise. Non-flammable gases are subject to the Regulations only when compressed, or liquefied by compression or refrigeration, or by a combination of compression and refrigeration. Non-flammable gases are treated as compressed gases whether compressed or maintained in liquid form by refrigeration or whether dissolved in a solvent under pressure.

Non-flammable compressed gases

44 A non-flammable compressed gas is defined as any compressed gas which does not possess the characteristics of a flammable or toxic gas.

Toxic gases

45 A toxic gas is defined as any gas which is known to be so toxic to man as to afford a hazard to health during conveyance or which, in the absence of adequate data on human toxicity, is presumed to be toxic to man and which may possess the characteristics of a flammable gas.

46 Any gas for which an acute toxicity on inhalation LC_{50} value of 3,000 parts per million or less has been demonstrated in animal experiments should be presumed toxic to man. LC_{50} is that concentration of gas which, administered by continuous inhalation to both male and female young adult albino rats for one hour, is most likely to cause death within 14 days in one-half of the animals tested.

Flammable gases

47 A flammable gas is defined as any gas which forms a flammable mixture with air at a concentration of 13% or less (by volume) or for which the flammable range with air is wider than 12% (by volume) regardless of the lower limit. These limits should be determined at normal atmospheric temperature and pressure. A suitable test method is described in COP 9.

Flammable liquids *(3; I, II or III)*

48 A flammable liquid is defined as any liquid, mixture of liquids or liquid containing solids in solution or suspension, which when tested in accordance with Part IV of Schedule 1 gives off a flammable vapour at a temperature not exceeding 55°C. However, two exceptions are made

(a) a liquid which gives off a flammable vapour at a temperature of 21°C and above, but not exceeding 55°C is excluded from the definition of a flammable liquid if, when tested at 55°C in the manner specified in Schedule 2 to the Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972 (SI 1972 No 917), it does not support combustion.

(b) certain viscous preparations, specified in Part III of Schedule 2, need not be classified as flammable if they comply with the conditions set out in that Part.

49 Flammable liquids are grouped for reference in the Appendix as follows.

Group 3 I - liquids with an initial boiling point of 35°C or less;

Group 3 II - liquids, other than those in Groups I or III, with flash point of 21°C or less;

Group 3 III - (a) liquids with flash point of over 21°C but not exceeding 55°C; and

(b) viscous liquids such as paints, enamels, varnishes, adhesives, polishes and certain colours for rotogravures and for leathers, but excepting mixtures containing nitrocellulose, if they meet the following requirements.

(i) less than 3% of the clear solvent layer separates in a solvent separation test (see Note 1); and

(ii) the viscosity (see Note 2) and flash point are in accordance with the following table:-

Kinematic viscosity γ (extrapolated) (at near-zero shear rate mm²/s at 23°C	Flow time t in accordance with ISO 2431-1980		
	secs	Jet diameter in mm	Flash point
$20 < \gamma \le 80$	$20 < t \le 60$	4	above 17°C
$80 < \gamma \le 135$	$60 < t \le 100$	4	above 10°C
$135 < \gamma \le 220$	$20 < t \le 32$	6	above 5°C
$220 < \gamma \le 300$	$32 < t \le 44$	6	above -1°C
$300 < \gamma \le 700$	$44 < t \le 100$	6	above -5°C
$700 < \gamma$	$100 < t$	6	-5°C and below

Notes

1 Solvent separation test: A suitable test is carried out at 23°C using a 100-ml graduated measuring cylinder of the stoppered type of approximately 250 mm total height and of a uniform internal diameter of approximately 30 mm over the calibrated section. The substance should be stirred to obtain a uniform consistency and poured into the measuring cylinder up to the 100 ml mark. The stopper should be inserted and the cylinder left standing undisturbed for 24 hours. After 24 hours the height of the upper separated layer should be measured and the layer's height as a percentage of the total height of the sample should be calculated.

2 Viscosity determination: Where the material concerned is non-Newtonian, or where a flow cup method of viscosity determination is otherwise unsuitable, a variable shear-rate viscometer should be used to determine the coefficient of dynamic viscosity of the material at 23°C at a number of shear rates, the values obtained plotted against shear rate and then extrapolated to zero shear rate. The dynamic viscosity thus obtained, divided by the density, gives the apparent kinematic viscosity at near-zero shear rate.

Flammable solids *(4.1; I, II or III)*

50 A flammable solid is defined as any solid substance (including sludges and pastes) which under normal conditions incident to conveyance can be ignited readily and when ignited burns so vigorously and persistently as to create a serious risk during conveyance, or which is liable to cause or contribute to fire through friction.

51 Certain substances which have the characteristic properties of an explosive within the meaning of the Classification and Labelling of Explosives Regulations 1983 may when wetted, normally with water, be so modified that they do not present a risk of explosion under the normal conditions of conveyance but do nevertheless present a fire risk. Such substances when so wetted are considered as flammable solids.

52 Any volatile solid or solid containing flammable liquids which, when tested in accordance with Part IV of Schedule 1, gives off a flammable vapour at a temperature not exceeding 55°C should be classified as a flammable solid, unless the exception made at para 48 (a) is applicable.

53 Apart from the test method described in COP 9 no detailed descriptions of tests relevant to the classification of flammable solids have as yet been developed, and classification should be decided by reference to the Approved List and comparison of the characteristic properties of the substance with those of substances classified as flammable solids in that list. Hay, straw and bhusa are not considered to be flammable solids within the meaning of the Regulations.

54 Flammable solids are grouped for reference to the Appendix as follows:

Group 4.1 I - any solid, normally water wetted, which, if in a dry state, would be treated as an explosive under the Classification and Labelling of Explosives Regulations 1983;

Group 4.1 II - a flammable solid which can be ignited readily or which when ignited burns very vigorously or intensely and is difficult to extinguish;

Group 4.1 III - any flammable solid which can be ignited readily and when ignited will sustain combustion.

Spontaneously combustible substances *(4.2; I II or III)*

55 A spontaneously combustible substance is defined as any substance which is liable to spontaneous heating under normal conditions incident to conveyance, or to heating up in contact with air, and being then liable to catch fire.

56 Certain substances, including those of animal or vegetable origin, which, when assembled in a large mass, are subject to oxidative self heating over a relatively long period of time, such as:

Rubber scrap and rubber shoddy, in powdered or granulated form
Copra
Cotton, waste oily
Cotton, wet
Fibres, animal or vegetable, burnt, wet or damp
Fibres or fabrics, animal or vegetable, with animal or vegetable oil
Fish meal, (unstabilised)
Iron oxide, spent, or iron sponge, spent (obtained from coal gas purification)
Paper, treated with unsaturated oils, incompletely dried (includes carbon paper)
Seed cakes (seed expellers) containing more than 1.5% oil and not more than 11% moisture

Wool waste, wet
Rags, oily
Textile waste, wet
Seed cake, containing not more than 1.5% of oil and 11% moisture

are not considered to be spontaneously combustible substances within the meaning of the Regulations.

57 No detailed descriptions of tests relevant to the classification of spontaneously combustible substances have as yet been developed, and classification should be decided by reference to the Approved List and comparison of the characteristic properties of the substance with those of substances classified as spontaneously combustible substances in that List.

58 Spontaneously combustible substances are grouped for reference to the Appendix as follows:-

Group 4.2 I	- any pyrophoric substance which ignites instantly on contact with air
Group 4.2 II	- any spontaneously combustible substance which is liable to ignite on contact with air, particularly under conditions of spillage;
Group 4.2 III	- any spontaneously combustible substance which is liable to exhibit self-heating properties.

Substances which in contact with water emit flammable gas (4.3; I, II or III)

59 A substance which in contact with water emits flammable gas is defined as any substance, which, by interaction with water, is liable to become spontaneously flammable or to give off flammable gas in dangerous quantities.

60 Apart from the test method described in COP 9, no detailed descriptions of tests relevant to the classification of such substances have at yet been developed, but any substance which in contact with water evolves flammable gas at a maximum rate for any one day of at least 500 ml/kg/day or at an average rate over one week of at least 200 ml/kg/day should be classified as a substance which in contact with water emits flammable gas.

61 Substances which in contact with water emit flammable gas are grouped for reference to the Appendix as follows:

Group 4.3 I	- any such substance which reacts vigorously with water at ambient temperatures and demonstrates generally a tendency for the gas produced to ignite in the presence of water or moisture;
Group 4.3 II	- any such substance which reacts readily with water at ambient temperatures, such that the maximum rate of gas evolution over any one day is equal to or greater than 500 ml/g/day, however the substance should be considered as of Group 4.3 I if the rate is equal to or greater than 500 ml/g over any one minute;
Group 4.3 III	-any such substance which reacts slowly with water at ambient temperatures such that the maximum rate of gas evolution at ambient temperature for any one day is equal to or greater than 500 ml/kg/day, but less than 500 ml/g/day, or the average rate over one week is equal to or greater than 200 ml/kg/day.

Oxidizing substances (5.1,I, II or III)

62 An oxidizing substance is defined as any substance, other than an organic peroxide, which, while in itself not necessarily combustible, may, either by yielding oxygen or by similar processes, increase the risk and intensity of fire in other materials with which it comes into contact.

63 No detailed descriptions of tests relevant to the classification of oxidizing substances have as yet been developed, but the oxidizing properties of a substance may be investigated using a fire test on a mixture of the substance with cellulose or sawdust in which a positive result indicating a burning rate greater than that demonstrated by anhydrous sodium dichromate means the substance should be classified as an oxidizing substance.

64 Oxidizing substances are grouped for reference to the Appendix as follows:

Group 5.1 I	- any substance which exhibits oxidizing properties to a greater degree than sodium chlorate;
Group 5.1 II	- any substance not placed in group 5.1 I which exhibits oxidizing properties to a greater degree than sodium nitrate;
Group 5.1 III	- any substance not placed in groups 5.1 I or II which exhibits oxidizing properties to a greater degree than anhydrous sodium dichromate.

Organic peroxides

65 An organic peroxide is defined as an organic compound containing the bivalent -0-0 structure, which may be considered a derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by organic radicals, present as a technically pure substance or in a mixture to such a proportion that the mixture exhibits the properties of an oxidizing substance as defined above.

Toxic substances (6.1; I or II)

66 A toxic substance is defined as any substance, which is known to be so toxic to man as to afford a hazard to health during conveyance or which, in the absence of adequate data on human toxicity, is presumed to be toxic to man.

67 Account should be taken of human experience in instances of accidental poisoning and of special properties possessed by any individual substance, such as liquid state, high volatility, any special likelihood of penetration and special biological effects. In the absence of human experience, classification should be based on data obtained from animal experiments. Three possible routes of administration should be examined. These routes are exposure through oral ingestion, dermal contact, and inhalation of dusts, mists, or vapours. Appropriate animal tests covering the various routes of exposure are as follows:-

(a) LD_{50} for acute oral toxicity: That dose of the substance administered which is most likely to cause death within 14 days in one half of both male and female young adult albino rats. The number of animals tested shall be sufficient to give a statistically significant result and be in conformity with good pharmacological practices. The result is expressed in milligrams per kilogram body weight;

(b) LD_{50} for acute dermal toxicity: That dose of the substance which, administered by continuous contact for 24 hours with the bare skin of the albino rabbit, is most likely to cause death within 14 days in one half of the animals tested. The number of animals tested shall be sufficient to give a statistically significant result and be in conformity with good pharmacological practices. The result is expressed in milligrams per kilogram body weight;

(c) LD_{50} for acute inhalation toxicity: That concentration of vapour, mist or dust which, administered by continuous inhalation to both male and female young adult albino rats for one hour, is most likely to cause death within 14 days in one half of the animals tested. If the substance is administered to the animals as a dust or mist, more than 90% of the particles available for inhalation in the test must have a diameter of 10 microns or less, provided that it is reasonably foreseeable that such concentrations could be encountered by man during transport. The result is expressed in milligrams per litre of air for dust and mists or in millilitres per cubic metre of air (parts per million) for vapours.

68 When a substance exhibits a different order of toxicity by two or more routes of administration, the highest degree of danger indicated by the tests should be considered when classifying the substance.

69 Substances are classified as toxic and grouped for reference to the Appendix in accordance with the criteria given in Table 2 below.

Table 2 Grouping of toxic and harmful substances for reference to the Appendix

	Sub-grouping	*(Oral*	*(Derm)*	*(Inh)*	
Classification	*Group*	*Oral toxicity LD_{50} (mg/kg)*	*Dermal toxicity LD_{50} (mg/kg)*	*Inhalation toxicity of dusts or mists* LC_{50} (mg/1,1hr)	*Inhalation Toxicity of vapours where V is the saturated vapour concentration produced by the substance at 20°C expressed by reference to LC_{50} (ml/m^3, 1 hr)*
Toxic substances (See paras 66-69)	6.1 I	≤ 5	≤ 40	≤ 0.5	$V \geq 10.LC_{50}$ and $LC^{50} \leq 1000$
	6.1 II	> 5 to ≤ 50	> 40 to ≤ 200	> 0.5 to ≤ 2	$V \geq LC_{50}$ and $LC_{50} \leq 3000$ but not placed in 6.1 I (Inh)
Harmful substances (See paras 70-73)	6.1 III	Solids: > 50 to ≤ 200 Liquids: ≥ 50 to ≤ 500	> 200 to ≤ 1000	> 2 to ≤ 10	$V \geq \frac{LC_{50}}{5}$ and $LC_{50} \leq 5000$ but not placed in either 6.1 I or II (Inh)

The above criteria are based on LC_{50} data relating to one hour exposure and where such information is available it should be used. However, where only LC_{50} data relating to 4 hour exposures is available then:

LC_{50} (4 hr) X 4 shall be considered equivalent to LC_{50} (1 hr) for dusts or mists, and
LC_{50} (4 hr) X 2 shall be considered equivalent to LC_{50} (1 hr) for vapours.

Harmful substances (6.1, III)

70 A harmful substance is defined as any substance, which is known to be toxic to man or, in the absence of adequate data on human toxicity, is presumed to be toxic to man, but which is unlikely to afford a serious acute hazard to health during conveyance.

71 In the absence of human experience, classification should be based on available data obtained from animal experiments (as described in para 67 above) ie determination of LD_{50} and LC_{50}.

72 When a substance exhibits a different order of toxicity by two or more routes of administration, the highest degree of danger indicated by the tests should be considered when classifying the substance.

73 Substances are classified as harmful and placed in Group 6.1 III, for reference to Appendix A, according to the criteria given in Table 2 above.

Corrosive substances (8; I II or III)

74 A corrosive substance is defined as any substance, which, by chemical action, will cause severe damage when in contact with living tissue, or in the case of leakage during conveyance will materially damage other freight or equipment.

75 A corrosive substance may be further defined as a substance possessing either of the following characteristics:

(a) causes visible necrosis of the skin tissue at the site of contact when tested on the intact skin of an animal for a period of less than 4 hours;

(b) a corrosion rate on steel or aluminium surfaces exceeding 6.25 mm a year at a test temperature of 55°C.

76 Corrosive substances are grouped for reference to the Appendix as follows:-

Group 8 I - any corrosive substance which causes visible necrosis of the skin tissue at the site of contact when tested on the intact skin of an animal for a period of up to 3 minutes;

Group 8 II - any corrosive substance which causes visible necrosis of the skin tissue at the site of contact when tested on the intact skin of an animal for a period of more than 3 and up to 60 minutes;

Group 8 III - any corrosive substance possessing either of the following characteristics:-

(i) causes visible necrosis of the skin tissue at the site of contact when tested on the intact skin of an animal for a period of up to 4 hours;

(ii) causes corrosion on steel or aluminium surfaces at a rate exceeding 6.25 mm a year at a test temperature of 55°C;

For testing purposes, steel of type P3 (ISO 2604 (IV) - 1975) or a similar type, and for aluminium, non-clad types 7075-T6 or AZ5GU-T6.

They are shown in the Appendix as either 8IL or 8IS, for example, to denote liquids or solids.

Other dangerous substances

77 Refers only to substances specified under this classification in Part IA of the approved list.

Choice of hazard warning sign

78 The choice of hazard warning sign is based on the results of the classification procedure. When a substance is classified under a single category as having only one of the characteristic properties mentioned in Part I of Schedule 2 then the corresponding hazard warning sign shown in column 3 of that Schedule is that required by Regulation 9(2)(b)(iii). It follows that the hazard warning signs for the categories: non-flammable compressed gas, toxic gas, flammable gas, organic peroxide and other dangerous substances are unique to such substances.

79 In any other case where a substance exhibits more than one characteristic property, the classification and hazard warning sign which is to take precedence is to be determined in accordance with the Appendix using the reference and group numbers (e.g. 4.1 I) given to each relevant classification category. The precedence of the characteristic property of an oxidizing substance is given only as a guide since the combination of that property with another will give rise to increased reactivity and each substance should be considered individually.

Additional particulars to be shown on a label

80 Under Regulation 9(2)(c), in a case where the quantity of a substance dangerous for conveyance in any receptacle is more than 25 litres, the labelling is required to show additional information on the nature of the dangers to which the substance may give rise and the action that should be taken in an emergency. The additional information should include the following:

(a) the nature of the dangers inherent in the dangerous substance being conveyed and the safety measures that need to be taken to avert them;

(b) the action to be taken and treatment to be given in the event of persons coming into contact with or being exposed to the substance being conveyed;

(c) the measures to be taken in the case of fire and, in particular, the fire fighting equipment to be used;

(d) the measures to be taken should the dangerous substance be spilled; and

(e) instructions on when to use any special safety equipment provided for the specific load being conveyed, e.g. protective clothing, specific antidotes, etc.

81 The information should have regard to the danger which is likely to arise in the event of an accident or emergency involving the amount of the substance conveyed and due regard should also be given to the impact, clarity and effectiveness of the label. As an alternative, the information may be given as part of an accompanying statement such as for example instructions in writing given to the driver of the vehicle used to convey the substance. In that case, the statement should also include:

(f) the name and address or telephone number or both of the consignor or of some other person in Great Britain from whom expert advice on the dangers created by the substance may be obtained;

(g) the designation of the substance; and

(h) the classification corresponding to the hazard warning sign shown on the label.

Appendix

Table to determine which classification category takes precedence in the choice of an appropriate hazard warning sign

	4.2	4.3	5.1	5.1	5.1	6.1	6.1	6.1	6.1	6.1	8	8	8	8	8	8
			I	II	III	1(Inh)	1(Derm)	1(Oral)	II	III	IL	IS	IIL	IIS	IIIL	IIIS
3 I			3	3	3	6.1	3	3	3	3	3	-	3	-	3	-
3 II			3	3	3	6.1	3	3	3	3	8	-	3	-	3	-
3 III			3	3	3	6.1	6.1	6.1	6.1	3	8	-	8	-	3	-
4.1 I	4.2	4.3	4.1	4.1	4.1	6.1	6.1	4.1	4.1	4.1	-	4.1	-	4.1	-	4.1
4.1 II	4.2	4.3	4.1	4.1	4.1	6.1	6.1	6.1	4.1	4.1	-	4.1	-	4.1	-	4.1
4.1 III	4.2	4.3	4.1	4.1	4.1	6.1	6.1	6.1	6.1	4.1	-	8	-	8	-	4.1
4.2 I		4.2	4.2	4.2	4.2	6.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
4.2 II		4.2	4.2	4.2	4.2	6.1	6.1	4.2	4.2	4.2	4.2	8	4.2	4.2	4.2	4.2
4.2 III		4.3	5.1	5.1	4.2	6.1	6.1	6.1	6.1	4.2	8	8	8	8	4.2	4.2
4.3 I			5.1	4.3	4.3	6.1	6.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
4.3 II			5.1	4.3	4.3	6.1	6.1	4.3	4.3	4.3	8	8	4.3	4.3	4.3	4.3
4.3 III			5.1	5.1	4.3	6.1	6.1	6.1	6.1	4.3	8	8	8	8	4.3	4.3
5.1 I						6.1	6.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
5.1 II						6.1	6.1	5.1	5.1	5.1	8	8	5.1	5.1	5.1	5.1
5.1 III						6.1	6.1	6.1	6.1	5.1	8	8	8	8	5.1	5.1
6.1 I (Inh)											6.1	6.1	6.1	6.1	6.1	6.1
6.1 I (Derm)											8	6.1	6.1	6.1	6.1	6.1
6.1 I (Oral)											8	6.1	6.1	6.1	6.1	6.1
6.1 II (Inh)											8	6.1	6.1	6.1	6.1	6.1
6.1 II (Derm)											8	6.1	8	6.1	6.1	6.1
6.1 II (Oral)											8	8	8	6.1	6.1	6.1
6.1 III											8	8	8	8	8	8

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